

## KINGS LYNN



## TIDAL DEFENCES



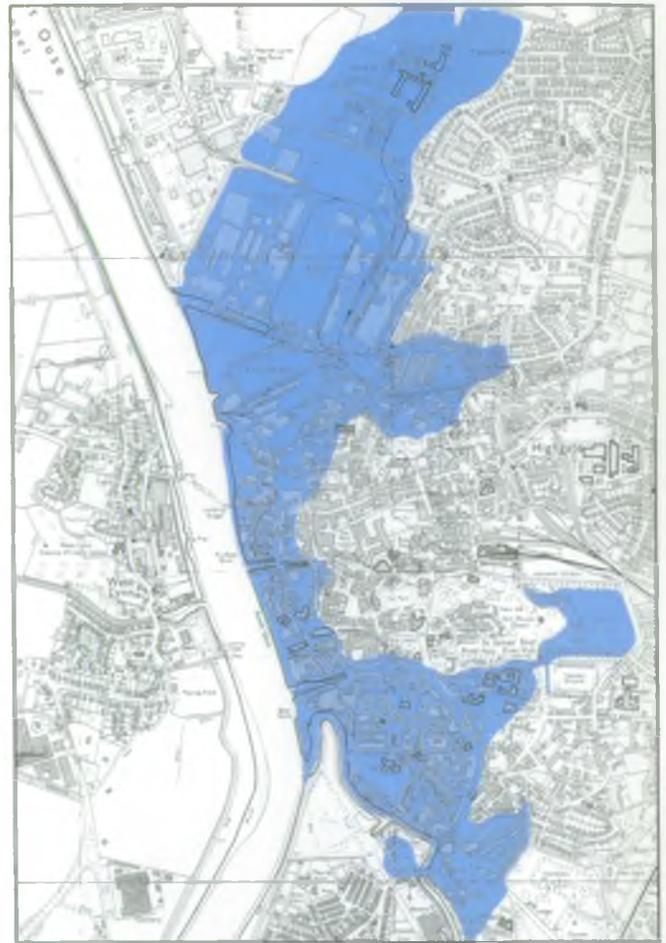
**NRA**

*National Rivers Authority  
Anglian Region*

## Introduction

Twice within living memory Kings Lynn has suffered the horrifying effects of flooding by the sea.

In the disastrous 1953 East Coast floods 15 people died and over 1,500 men, women and children were evacuated from the lower part of the town when a tidal surge swept through the area causing widespread damage to houses and commercial property. Twenty-five years later the town was further devastated when an even greater surge tide caused hundreds of thousands of gallons of sea water to pour over the defences creating distress and causing widespread damage to property. Fortunately on this occasion no one died but the cost of the damage was estimated at about £5.5 million.



In 1981 work began on a programme designed to protect the town against flooding from tidal surges and a decade later a £5 million defence scheme will be completed.

Carried out in ten stages the project has included:

- ★ the building of 1.5kms of concrete surge wall
- ★ the construction of four outfall structures across the old fleets and tidal creeks
- ★ replacing the Alexander Dock gates with new purpose built gates
- ★ installing 53 flood gates, all of which have to be closed when a surge tide is forecast.



In addition the existing earth banks which form part of the defences are being raised and strengthened to provide the same one in 100 year standard of protection as the hard defences.



## THE KINGS LYNN SCHEME

### Stage 1. FISHER FLEET

The Fisher Fleet, located in the vicinity of the docks, is of major importance to the town being the main berthing area for the local fishing fleet.

Flood protection to the adjacent docks area has been provided by building a reinforced concrete surge wall which completely surrounds the Fisher Fleet. Access is provided through six steel flood gates which are closed in the event of a surge tide developing.

This work was completed in 1981.



### Stage 2. DOCK GATE

From the Fisher Fleet the reinforced concrete surge wall continues along the tidal river frontage to link up with the entrance to the Alexander Dock.

The old dock gates consisted of two sets of pointing vee doors which held a suitable head of water in the docks to keep shipping afloat during "low tide" periods. These gates were opened at "high tide" to enable the passage of shipping into and out of the docks.

With close co-operation between Associated British Ports, the owners and operators of the docks, and the National Rivers Authority, a new dock gate was designed and constructed which meets the requirements of the docks operations and, when closed, provides a defence against surge tides.

The sector gate design was adopted because when closed it is able to withstand pressure from a head of water in either direction.

Installation of the dock gate was completed in 1990.



### Stage 3. COMMON STAITHE QUAY

Between the new dock gate and Common Staithe Quay protection has been provided with a further length of reinforced concrete surge wall with one section incorporated into the building of the Trinity Quay development.

Two flood gates are provided in the Common Staithe surge wall – one at the entrance to the Conservancy Board Buoy Store and the other as part of improvements by Kings Lynn and West Norfolk Borough Council which give access to the public slipway.



#### Stage 4. PURFLEET QUAY

Work on this section of the defences involved providing steel flood gates to eight doorways and damboards to seal off the access between No. 1 Kings Street and the Customs House. In addition the walls of the Custom House were strengthened to enable them to take the force of a surge tide and the Purfleet Bridge opening was sealed.

This work was completed in 1986.



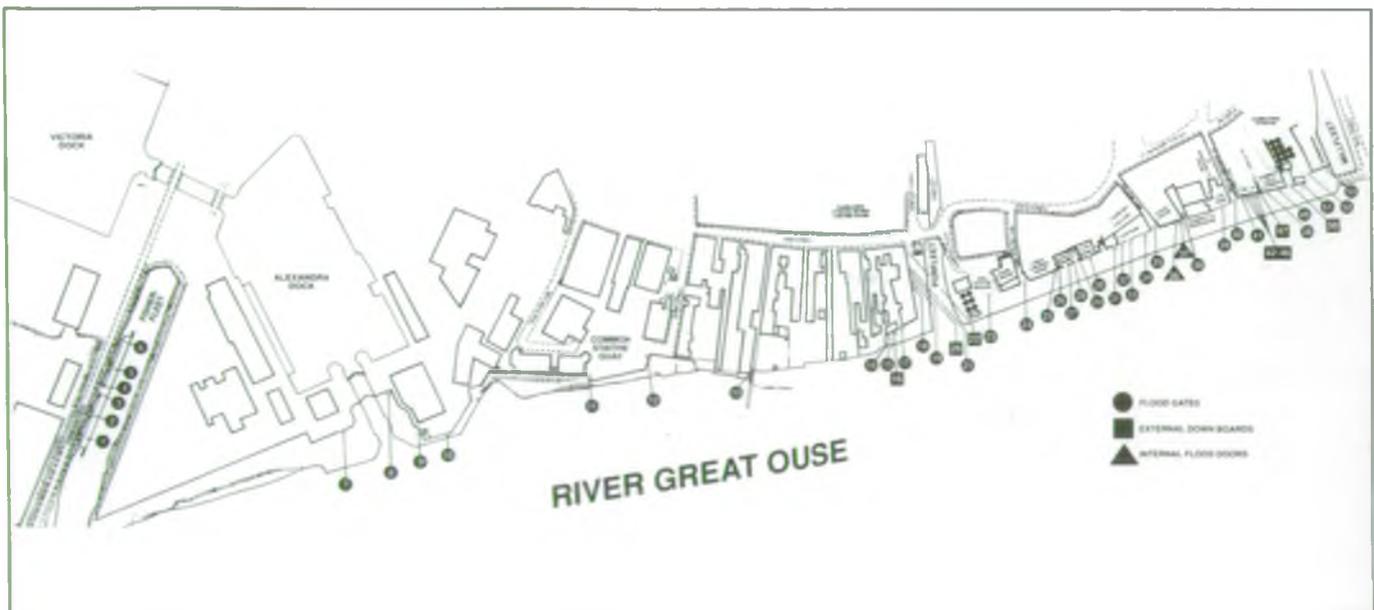
#### Stage 5. SOUTH QUAY

One of the most difficult areas to provide defences was the South Quay from the Purfleet to the Millfleet which contains some of the town's most important historical buildings and is a designated conservation area.

Defences along the quay involved strengthening existing walls, removing many lengths of wall and rebuilding them with a reinforced concrete core and reclaimed brick cladding. In addition 22 flood gates and nine sets of damboards had to be installed to seal off doorways and highways. All windows below the design level had either their sills raised or were provided with damboard slots.

In the event of a surge tide all of these gates and damboard openings must be closed and a comprehensive set of procedures has been implemented by the NRA to ensure the closure is carried out.

This stage will be completed during 1990-91.



#### **Stage 6. MILLFLEET**

A tidal barrier with a two metre diameter flapped culvert was built across the Millfleet to enable water from the Gaywood River to be discharged at low tide. The flap prevents tidal water from entering the Millfleet as the tide rises.

This barrier also carries a highway onto the South Quay which was included in the scheme after consultation with Norfolk County Council.

This work was completed in 1989.



#### **Stage 7. NAR OUTFALL**

Until the construction of a barrier across the downstream end of the River Nar this river was tidal to a point of 1 km upstream.

The building of the barrier, which includes two box culverts with flapped outfalls, has removed the need for sea defences along this section of river.

The structure also includes boat mooring facilities to accommodate boats which used to moor within the River Nar.

This stage was completed in 1988.



#### **Stage 8. NAR-MILLFLEET LINK**

To provide protection between the Nar Outfall and the Millfleet barrier another length of reinforced concrete surge wall has been built and the level of the Millfleet access road raised to the defence level. This allows access without the need for a gate.

The area between the Nar and the Millfleet is proposed for major redevelopment and close co-operation between the Borough Council and the NRA is taking place to ensure that the requirements of sea defence are catered for in any of the development proposals.

This stage was completed in late 1990.



**Stage 9. THE FISHERMANS QUAY**

This quay was improved and extended to accommodate boats displaced from the Millfleet after the construction of the Millfleet Barrier under stage 6.



**Stage 10. WEST LYNN CREEK**

The old outfall structure of the West Lynn drain and earth bank defences around the tidal creek were not adequate to deal with a major surge event. The West Lynn Creek barrier was built at the end of the creek incorporating a square box culvert with flapped outfall.

An earth bank was raised above the structure to link in with the existing flood banks on either side.



**OTHER WORKS**

Work is also in progress on the banks of the Ouse from Kings Lynn to Denver which are being raised downstream of Denver to counter a future threat of flooding from high tides.



## EMERGENCIES

The Storm Tide Warning Service, a section of the Meteorological Office located in Bracknell, Berkshire, has the task of forecasting surge tides which are usually caused by deepening depressions which move across Scotland and down the North Sea on their way towards Denmark. The resultant surge moves down the east coast in a north-south direction.

When a surge which is likely to cause flooding is predicted the Service issues a warning to the National Rivers Authority, coastal police forces and coastal local authorities.

When such a warning is received regional emergency procedures are put into operation to provide further information, via area control rooms which are linked to the NRA communication network, and to monitor the rising tide as the surge develops.

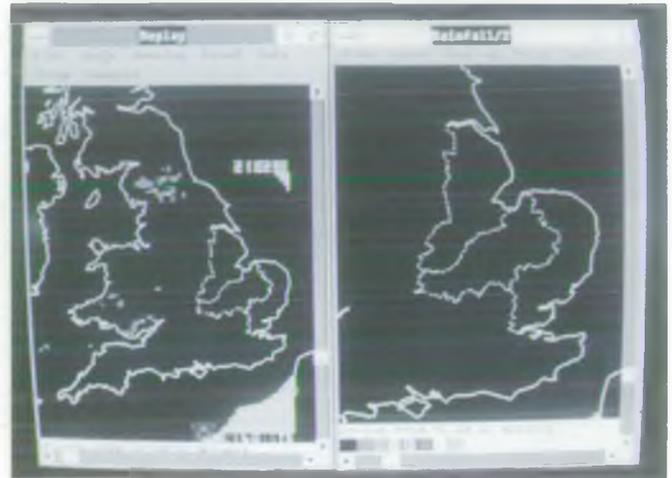
Colour phased flood warning statements are issued to the Police by the NRA. These are:

- Yellow – Flooding possible
- Amber – Flooding is likely
- Red – Serious flooding is likely

Additional information is also given in these statements to specific locations.

If the danger level in Kings Lynn is predicted to be exceeded then in cooperation with the police, local authorities and the dock master, the NRA arranges for all flood gates to be closed.

Closure of the flood gates is usually accompanied by a Red Flood Warning statement and the police may then decide to issue a public warning which involves the sounding of sirens in Kings Lynn and along the coastline between Hunstanton and Snettisham.





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**Guardians of the  
Water Environment**

The National Rivers Authority is a public body whose task is to protect and improve the water environment in England and Wales, and provide protection against flooding from rivers and the sea.

Flood defence is vitally important to the Anglian region which is low lying and where nearly 20 per cent of the area is below high tide level. It also has one of the most vulnerable coastlines in Britain which is constantly at risk from the threat of a North Sea "surge" similar to the one which devastated the region in 1953.

The NRA is responsible for

- ★ maintaining main rivers and carrying out any necessary improvement works;
- ★ flood protection from rivers;
- ★ maintaining and providing sea defences;
- ★ protection from sea flooding in estuaries;
- ★ land drainage.

These activities are co-ordinated through a regional headquarters at Peterborough in Cambridgeshire and carried out through operational areas.

National Rivers Authority  
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